UNIVERSAL BOREHOLE INSTALLING TOOL

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by

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SUMMARY

A universal borehole installation tool was built which allows installation of different sizes of instrumentation into boreholes ranging from a diameter of 75 mm (2 15/16") to 221 mm (8 11/16").

This makes it easy to install different sizes of monitoring equipment in a one size drill hole or install standard size equipment into different size drill holes without retooling.

KEYWORDS: Borehole installation, centering device.

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OUTIL UNIVERSEL DE MISE EN PLACE DES APPAREILS DANS DES TROUS DE SONDE

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SOMMAIRE

On a mis au point un outil universel de mise en place des appareils dans des trous de sonde. Il permet d'installer des appareils de diverses dimensions dans des trous de sonde dont les diamètres varient de 75 mm (2 15/16") à 221 mm (8 11/16").

Cet outil facilite l'installation de dispositifs de surveillance de dimensions diverses dans un trou de sonde dont le diamètre est unique ou la mise en place d'appareils de dimensions régulières dans des trous de sonde dont les dimensions varient, sans avoir besoin de recourir à d'autres outils.

MOTS CLÉ: mise en place de dispositifs dans un trou de sonde; dipositif de centrage.

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1. INTRODUCTION

In rock mechanics most of the remote monitoring and physical properties measurements are done in diamond drill holes. Slight deviations in borehole sizes and the need to install standard size equipment in different size boreholes requires the building of centering devices or adapter rings. With the variation of borehole equipment available, it was decided to build a centering device which allows adjustment to different borehole diameters on site.

2. UNIVERSAL BOREHOLE INSTALLING TOOL

The universal borehole installing tool was built with the aim of allowing installation of instrumentation in boreholes from 75 mm diameter to 220 mm diameter. It had to be light and it had to be suitable to carry a number of adapters which can be exchanged quickly in the field.

The system which was chosen is shown in an overview in Figure 1. The centering is achieved by two guide assemblies which are mounted on a heavy steel tube. Each guide assembly (Figure 2) consists of three arms which can be adjusted to hold the installing rod in the centre of a drill hole. The arms are fitted with small wheels for the centering unit to role along the borehole well. The list of parts required to make up a guide assembly is given below:

1. Pivot boss (Figure 3);
2. Spreader ring (Figure 4);
3. Pivot boss retaining ring (Figure 5);
4. Pivot boss retainer;
5. Spreader ring retainer;
6. Guide arm (Figure 6);
7. Wheel;
8. Pivot pin;
9. Torsion spring;
10. Hose clamp;
11. Retainer screw;

12. Wheel assembly washer;
13. Wheel assembly lock washer;
14. Pivot pin nut;
15. Adapter.

A mercury switch is provided to identify the horizontal position.

The present assembly is mounted on 22.2 mm (7/8 in.) diameter heavy wall steel tubing. Adapters which connects to IRAD installing rods have been built for the following borehole instrumentation:

- USBM deformation meter;
- South African triaxial strain cell (Figure 1);
- Ex pilot hole cleaner;
- South African doorstopper;
- CSIRO hollow inclusion stress gauge;
- MRL strain ring;
- Borehole video camera.

3. FIELD EXPERIENCE

The universal installing tool was used at the Macassa Mine, Lac Minerals Ltd., Kirkland Lake, Ontario at a depth of 1585 m and 1890 m in the summer of 1985 to install a South African strain cell. No problems were encountered in the borehole. In the summer of 1986 MRL strain rings were installed at the Niobec Mine near St. Honoré, Quebec. The borehole was rough and had one open fracture. No problem was encountered in going into the drill hole and past an open crack. However, the heavy hydraulic installation tool for the strain rings bent the 3.2 mm (0.125 in.) thick centering arms when an obstruction was hit. A future version should be fitted with heavier arms, and a stop should be provided to avoid the arms hitting the bottom of large holes.

4. ACKNOWLEDGEMENTS

The authors are grateful that D. Dugmore and J. Folta prepared the drawings.

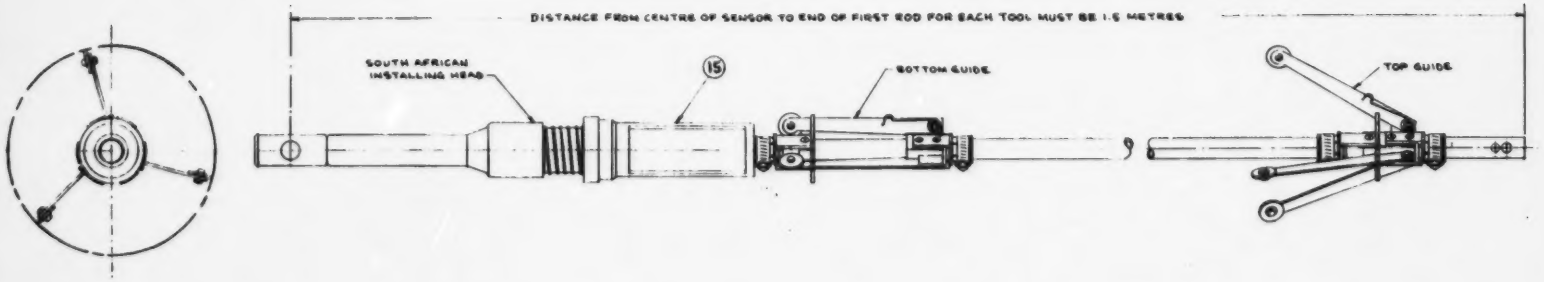

DISTANCE FROM CENTRE OF SENSOR TO END OF FIRST ROD FOR EACH TOOL MUST BE 1.5 METRES
SOUTH AFRICAN INSTALLING HEAD
15
BOTTOM GUIDE
TOP GUIDE

Figure 1: Universal borhole installing tool with adapter for South African installing unit

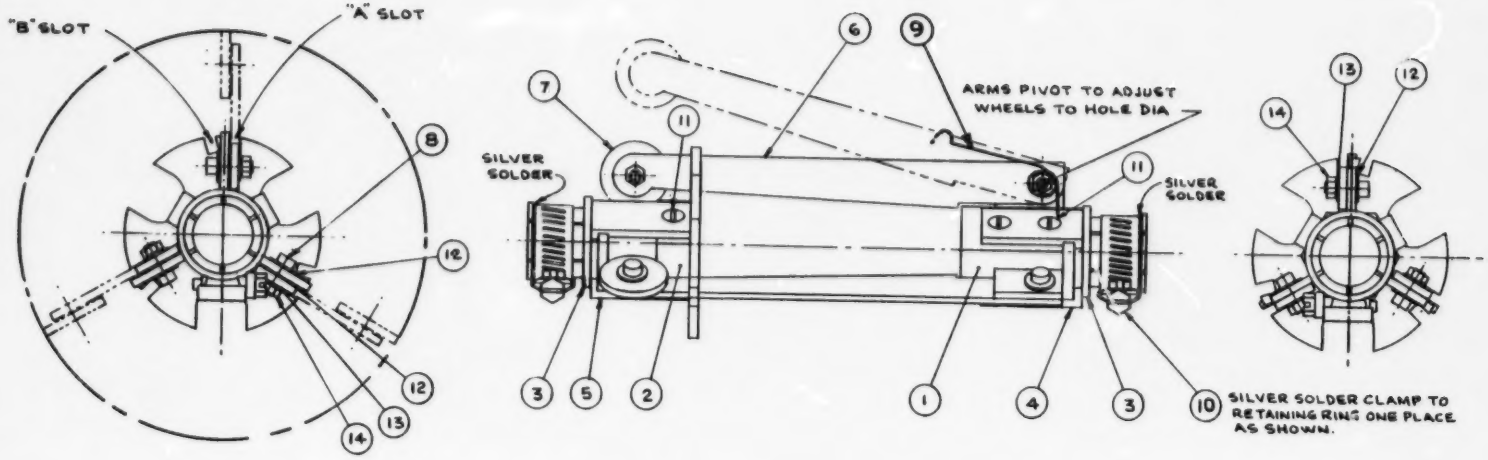


Figure 2: Guide assembly

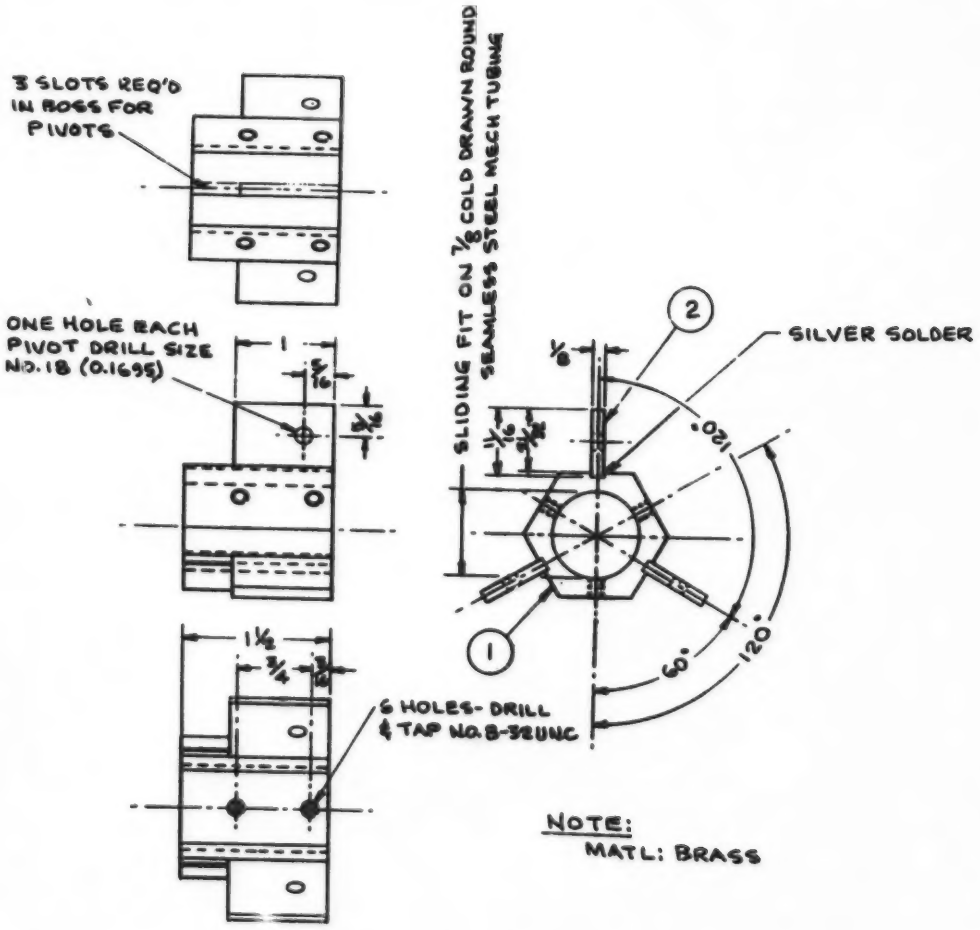

3 SLOTS REQ'D IN BOSS FOR PIVOTS
ONE HOLE EACH PIVOT DRILL SIZE NO. 18 (0.1695)
SLIDING FIT ON 1/8 COLD DRAWN ROUND SEAMLESS STEEL MECH TUBING
SILVER SOLDER
6 HOLES- DRILL & TAP NO.8-32 UNC
NOTE:
MATL: BRASS

Figure 3: Pivot boss

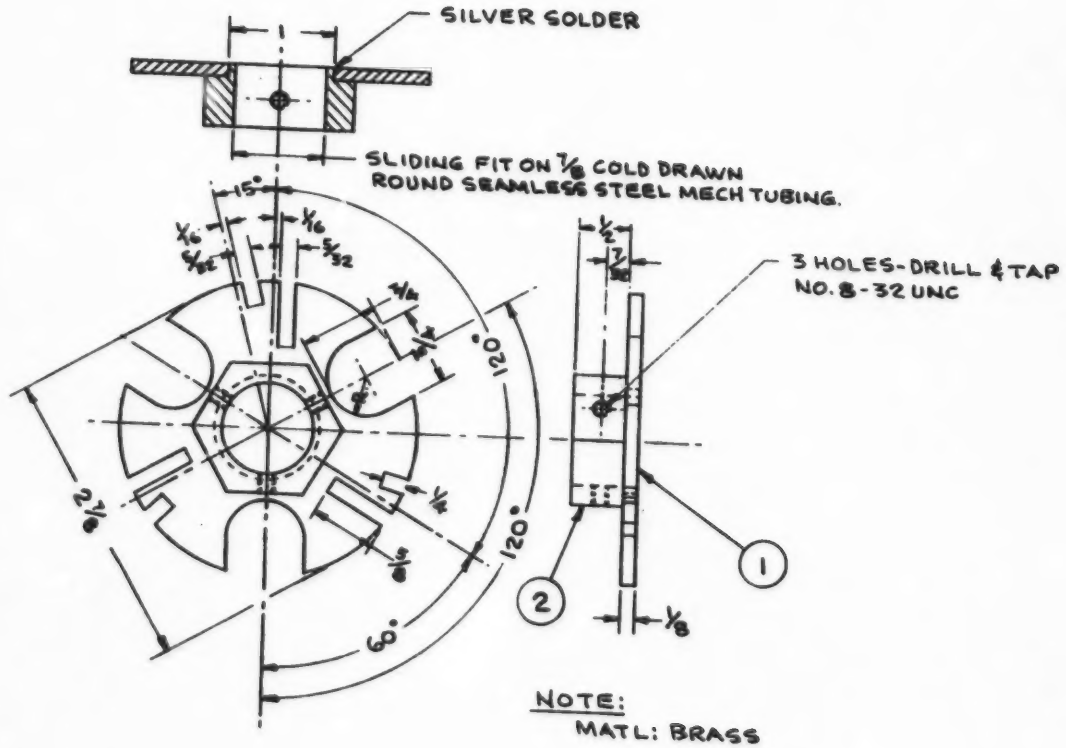
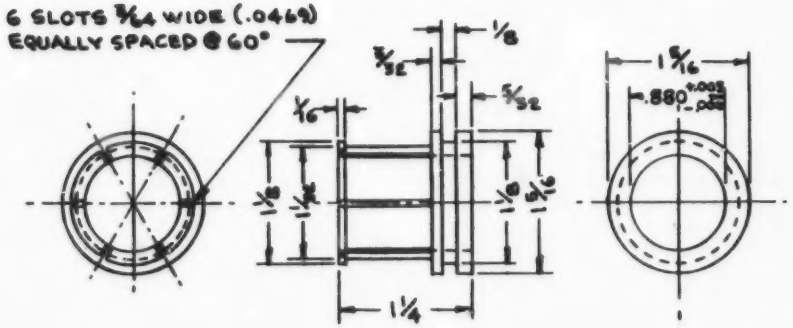
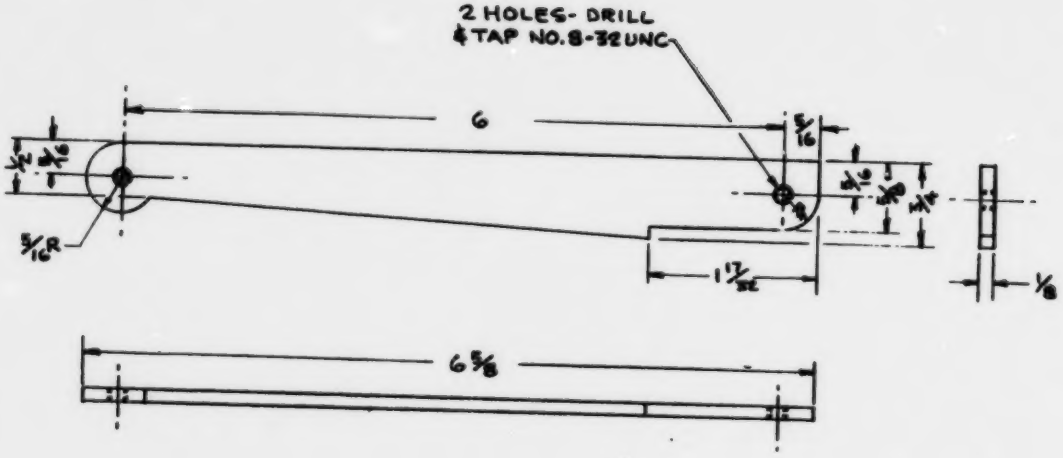


Figure 4: Spreader ring



NOTE:
MATL: BRASS

Figure 5: Pivot boss retaining ring



NOTE:
MATL: MILD STEEL
REMOVE SHARP EDGES & BURRS

Figure 6: Centering arm